IN THE CLAIMS:

1. A distributed Bragg reflector for use in a vertical cavity surface emitting laser, comprising a plurality of layers of semiconductor material doped to reduce voltage drop and optical loss in a vertical cavity surface emitting laser, the plurality of layers including at least one layer having the element antimony (Sb), wherein the plurality of layers of semiconductor material also including the elements arsenic, aluminum, and gallium.

2. The distributed Bragg reflector of claim 1, wherein the plurality of layers of semiconductor material are epitaxially grown on a substrate.

3. The distributed Bragg reflector of claim 2, wherein the substrate includes indium phosphide (InP).

4. The distributed Bragg reflector of claim 2, wherein the plurality of layers are comprised of alternating layer pairs of $Al_aGa_{1-a}As_bSb_{1-b}$ which are approximately lattice-matched to InP, and where "a" and "b" indicate relative proportions of atoms.

5. The distributed Bragg reflector of claim 4, wherein "a" is greater than 0.9 in one layer of the alternating layer pairs and less than 0.9 in another layer of the alternating layer pairs.

6. The distributed Bragg reflector of claim 4, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.3 in another layer of the alternating layer pairs.

7. The distributed Bragg reflector of claim 4, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.9 in another layer of the alternating layer pairs.

8. The distributed Bragg reflector of claim 4, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and "a" is large enough such that the layer is substantially transparent to lasing light.

9. The distributed Bragg reflector of claim 2, wherein the substrate is n-doped with the element selenium (Se).

10. The distributed Bragg reflector of claim 1, wherein the plurality of layers of semiconductor material are configured to form a reflective device.

11. The distributed Bragg reflector of claim 10, wherein the reflective device is n-doped using tellurium.

12. A device for reflecting light to an active region in a vertical cavity surface emitting laser, comprising:

a mirror portion including the element antimony (Sb) epitaxially grown on a substrate, the mirror portion including a plurality of layers of semiconductor material, wherein electric current is pumped through the plurality of layers forming the mirror portion to electrically pump the active region.

13. The device of claim 12, wherein the substrate includes indium phosphide (InP).

14. The device of claim 13, wherein the substrate is n-doped with the element selenium (Se).

15. The device of claim 12, wherein the mirror portion is n-doped to reduce voltage drop and optical loss in a vertical cavity surface emitting laser.

16. The device of claim 15, wherein the mirror portion is n-doped using tellurium.

17. A vertical cavity surface emitting laser, comprising:

a pair of mirror portions including the element antimony (Sb) epitaxially grown on a substrate, the pair of mirror portions including a plurality of layered stacks of paired semiconductor material, wherein the pair of mirror portions are n-doped to reduce voltage drop and optical loss;

an active region epitaxially grown on the substrate and positioned between the pair of mirror portions;

a doped tunnel junction configured to provide electron-hole conversion from one of the pair of mirror portions; and

wherein the pair of mirror portions, the active region, and the tunnel junction are epitaxially grown on the substrate in a single step, and wherein electric current is pumped through the pair of mirror portions to electrically pump the active region.

18. The vertical cavity surface emitting laser of claim 17, wherein the substrate includes indium phosphide (InP).

19. The distributed Bragg reflector of claim 17, wherein the plurality of layers are comprised of alternating layer pairs of $Al_aGa_{1-a}As_bSb_{1-b}$ which are approximately lattice- matched to InP, where "a" and "b" indicate relative proportions of the atoms.

20. The distributed Bragg reflector of claim 19, wherein "a" is greater than 0.9 in one layer of the alternating layer pairs and less than 0.9 in another layer of the alternating layer pairs.

21. The distributed Bragg reflector of claim 19, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.3 in another layer of the alternating layer pairs.

22. The distributed Bragg reflector of claim 19, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.9 in another layer of the alternating layer pairs.

23 The distributed Bragg reflector of claim 19, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and "a" is large enough such that the layer is substantially transparent to lasing light.

24. The vertical cavity surface emitting laser of claim 17, wherein the substrate is n-doped with the element selenium (Se).

25. The vertical cavity surface emitting laser of claim 17, wherein the doped tunnel junction is n-doped with silicon (Si).

26. The vertical cavity surface emitting laser of claim 17, wherein the doped tunnel junction is p-doped with CBr4.

27. The vertical cavity surface emitting laser of claim 17, wherein the pair of mirror portions include a first mirror portion positioned on a top of the active region and a second mirror portion positioned below the active region.

28. The vertical cavity surface emitting laser of claim 27, wherein the first and second mirror portions are n-doped using tellurium.

29. The vertical cavity surface emitting laser of claim 17, wherein the active region is grown to include a cavity having five strain compensated quantum wells, the quantum wells including the elements aluminum, indium, gallium, and arsenic.

30. The vertical cavity surface emitting laser of claim 17, wherein the VCSEL operates in the approximate range from between 1.3 microns and 1.6 microns.

31. A vertical cavity surface emitting laser comprising:

a substrate on which a pair of mirror portions, an active region, and a tunnel junction are epitaxially grown in a single step in which semiconductor elements are deposited to form a multi-layered structure; and

at least one metal contact disposed on the substrate, wherein electric current is pumped through the pair of mirror portions to electrically pump the active region.

32. The vertical cavity surface emitting laser of claim 21, wherein the substrate includes indium phosphide (InP).

33. The distributed Bragg reflector of claim 32, wherein the plurality of layers are comprised of alternating layer pairs of $Al_aGa_{1-a}As_bSb_{1-b}$ which are approximately lattice- matched to InP, where "a" and "b" indicate relative proportions of the atoms.

34. The distributed Bragg reflector of claim 33, wherein "a" is greater than 0.9 in one layer of the alternating layer pairs and less than 0.9 in another layer of the alternating layer pairs.

35. The distributed Bragg reflector of claim 33, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.3 in another layer of the alternating layer pairs.

36. The distributed Bragg reflector of claim 33, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and greater than 0.9 in another layer of the alternating layer pairs.

37. The distributed Bragg reflector of claim 33, wherein "a" is less than 0.3 in one layer of the alternating layer pairs and "a" is large enough such that the layer is substantially transparent to lasing light.

38. The vertical cavity surface emitting laser of claim 31, wherein the substrate is n-doped with the element selenium (Se).

39. The vertical cavity surface emitting laser of claim 31, wherein the doped tunnel junction is n-doped with silicon (Si).

40. The vertical cavity surface emitting laser of claim 31, wherein the doped tunnel junction is p-doped with CBr4.

41. The vertical cavity surface emitting laser of claim 31, wherein the VCSEL operates in the approximate range from between 1.3 microns and 1.6 microns.

42. The vertical cavity surface emitting laser of claim 31, wherein the pair of mirror portions include a first mirror portion positioned on a top of the active region and a second mirror portion positioned below the active region.